CLAIMS:

1. (currently amended) A method of acquiring interferogram data in a Fourier transform spectrometer, the spectometer including a detector that provides an output signal that exhibits non-linear distortion in a measured interferogram represented by a power series $I_m = a_1 I + a_2 I^2 + a_3 I^3 + \ldots$, comprising:

   representing a measured spectrum $S_m = a_1 S + a_2(S*S) + a_3(S*S*S) + b_3 (S*S*S*S) + \ldots$ wherein S is the spectrum of the linear interferogram and * indicates convolution;

   expressing a linear interferogram I as a power series of a measured interferogram I_m as in $I = b_1 I_m + b_2 I_m^2 + b_3 I_m^3 + \ldots$;

   expressing the linear spectrum as a power series of the spectra of the interferogram powers $S = b_1 S_1 + b_2 S_2 + b_3 S_3 + \ldots$;

   measuring the non-linear effects of the detector from one or more resolution elements in spectral regions known to have no energy; and

   obtaining the coefficients b_i where $S = 0$ by applying the measured non-linear effects to $S = b_1 S^1 + b_2 S^2 + b_3 S^3 + \ldots$.

2. (original) The method of claim 1 wherein:

   a set of m measurements from 1 to n + 1 is selected from the spectra of the powers of the measured interferogram where S = 0; and

   making $b_1 = 1$ and m = n.

3. (original) The method of claim 1 wherein:

   a set of m measurements from 1 to n + 1 is selected from the spectra of the powers of the measured interferogram where S = 0;

   m > n;

   and the least square approximation is used to find b_i.

4. (original) The method of claim 1 wherein:

for each measurement of the measured spectra the average of 2 or more resolution elements in the spectra of the powers of the measured interferogram is used to compute b_i.

5. (original) The method of claim 1 wherein:

the measured interferogram is collected by an AC signal channel and a DC offset is taken from the measured interferogram collected by a DC coupled signal channel.

6. (original) The method of claim 1 wherein:

the detector is a single point detector.

7. (original) The method of claim 1 wherein:

the detector is a one dimensional detector.

8. (original) The method of claim 1 wherein:

the detector is a two dimensional detector.

9. (original) The method of claim 1 wherein:

the detector is a photovoltaic detector.

10. (original) The method of claim 1 wherein:

the detector is a photoconducting detector.

11. (original) The method as in claim 1 wherein:

the detector is a bolometric detector.

12. (original) A Fourier transform spectrometer comprising:

an interferometer;

a reference electromagnetic radiation source;

an infrared radiation source;

a detector that provides an output signal from the reference and infrared sources that exhibits a non-linear variation;

a preamplifier circuit, responsive to the output signal, producing an output signal;

an amplifier circuit, responsive to the preamplified signal, producing an output signal;

means for digitizing the amplified output signal to provide a measured interferogram;

signal processing means for acquiring interferogram data wherein the measured interferogram is represented as a measured spectrum $S_m = a_1S + a_2(S*S) + a_3(S*S*S) + b_3 (S*S*S*S) + \ldots$ wherein S is the spectrum of the linear interferogram and * indicates convolution, a linear interferogram I is expressed as a power series of a measured interferogram I_m as in $I = b_1I_m + b_2I_m^2 + b_3I_m^3 + \ldots$, the linear spectrum is expressed as a power series of the spectra of the interferogram powers $S = b_1S_1 + b_2S_2 + b_3S_3 + \ldots$, and the coefficients b_i are computed where $S = 0$.

13. (currently amended) A Fourier transform spectrometer as in claim 12 wherein:

the signal processing means selects a set of m measurements from 1 to n + 1 from the spectra of the powers of the measured interferogram where S = 0; and

makes $b_1 = 1$ and m = n.

14. (original) A Fourier transform spectrometer as in claim 12 wherein:

the signal processing means selects a set of m measurements from the spectra of the powers of the measured interferogram from 1 to n + 1 where S = 0; and

makes m > n; and

uses the least square approximation to find b_i.

15. (original) A Fourier transform spectrometer as in claim 12 wherein:

the signal processing means uses for each measurement of the measured spectra the average of 2 or more resolution elements in the spectra of the powers of the measured interferogram to compute b_i.

16. (original) A Fourier transform spectrometer as in claim 12 wherein:
the amplifier uses an AC signal channel.

17. (original) A Fourier transform spectrometer as in claim 16 wherein:
a DC offset is taken from the measured interferogram collected by a DC coupled amplifier.

18. (currently amended) A Fourier transform spectrometer as in claim 12 wherein:
the detector is a single point detector.

19. (original) A Fourier transform spectrometer as in claim 12 wherein:
the detector is a one dimensional detector.

20. (original) A Fourier transform spectrometer as in claim 12 wherein:
the detector is a two dimensional detector.

21. (original) A Fourier transform spectrometer as in claim 12 wherein:
the detector is a photovoltaic detector.

22. (original) A Fourier transform spectrometer as in claim 12 wherein:
the detector is a photoconducting detector.

23. (original) A Fourier transform spectrometer as in claim 12 wherein:
the detector is a bolometric detector.